REMARKS/ARGUMENTS

The Office Action mailed February 13, 2004, has been reviewed and the comments therein were carefully considered. Claims 1-8, 13-19, 21-25, and 27-30 remain pending. Claims 9-12, 20, 26, and 31-33 are cancelled. Claims 9 and 11 are newly cancelled in this Amendment.

Rejections under 35 USC § 103

Claims 1-8, 13-19, 21, 23-25, and 27-30 were rejected under 35 U.S.C. 103(a) as being unpatentable over Gulick (U.S. Patent 6,421,702) in view of Nakamura (U.S. Patent 5,437,047) in view of Reiffin (U.S. Patent 6,330,583). Claims 8 and 22 were rejected under 35 U.S.C. 103(a) as being unpatentable over Gulick in view of Nakamura in view of Patterson et al. (U.S. Patent 6,320,882). Claims 13-15 were rejected under 35 U.S.C. 103(a) as being unpatentable over Gulick in view of Nakamura.

Claim 1 is directed to a method of scheduling CPU resources comprising the steps of: using a counter to determine when to allocate the CPU resources; instructing an interrupt controller, via non-maskable interrupts from the counter, to allocate the CPU resources; and instructing the CPU to allocate resources in real-time by the interrupt controller issuing non-maskable interrupts to the CPU.

Gulick, Nakamura, and Reiffin, either alone or in combination, do not establish prima facie obviousness of claim 1 because they do not disclose use of non-maskable interrupts as recited in claim 1. Gulick is characterized in the office action as disclosing: a method of scheduling CPU resources by: (1) using a counter to determine when to allocate the CPU resources; and (2) instructing the CPU to allocate resources in real-time. Nakamura is

characterized in the office action as disclosing the step of allocating CPU resources via non-maskable interrupts issued from a counter.

Applicant respectfully disagrees with this characterization of the respective teachings of Gulick and Nakamura. In contrast to the invention recited in Claim 1, Gulick discloses real-time interrupts that cause an operating system to provide execution time slices for pending isochronous (i.e., time-dependent) tasks. Each application informs the operating system of an execution rate and a maximum duration of its isochronous tasks. The operating system includes a non-maskable interrupt to terminate isochronous tasks. Termination is necessary when an isochronous task fails to finish executing within its specified maximum duration. (Abstract).

Gulick discloses use of non-maskable interrupts only for terminating isochronous tasks that fail to finish executing within their specified maximum duration. (Col. 11, lines 3-23). Such termination of isochronous tasks is different than preemption of tasks by higher priority tasks. (See Gulick, col. 10, lines 39-46, "It is noted that termination is distinct from preemption. Preemption is the normal suspending of a task so that another task may begin executing. For example, in FIG. 4, Task A is preempted to allow Task B to execute. Termination is the stoppage of a task due to an unexpected condition. For example, a task may continue execution beyond the duration specified for the task.")

Nakamura discloses a system for gathering and safeguarding program-run information of individual processors in a multi-processor system by transferring information to external storage. (Abstract). Each of the processors is periodically provided with a non-maskable timer interrupt. (Col. 3, lines 14-20). Respective corresponding interrupt handlers collect context information

about the programs being run by the processors and store the collected information in shared memory. (Col. 3, line 62 through col. 4, line 14).

The Office Action states that it would have been obvious to one of ordinary skill in the art to combine Gulick with Nakamura "since the disclosure of Gulick fails to specify the type of interrupt that is issued by the timer." (Office Action, page 3). This rationale does not set forth a convincing line of reasoning as to why a person of ordinary skill in the art would be motivated to modify the system disclosed by Gulick as proposed in the Office Action. In other words, Gulick's silence as to the type of interrupt issued by the timer would not motivate one of ordinary skill to substitute the non-maskable interrupts from Nakamura into the system disclosed by Gulick.

The Office Action states that Gulick discloses using non-maskable interrupts issued from the operating system to preempt an executing task by a higher priority task. (Office Action, pages 3-4). Gulick does not, however, disclose, teach, or suggest using non-maskable interrupts to preempt execution of a task by execution of a higher-priority task. The Abstract of Gulick states, "an isochronous task may be preempted to execute a higher priority task. The operating system may include two types of time-slices. Higher priority tasks are allocated to quick slices and lower priority tasks are allocated to standard slices. Standard slices are preemptable and quick slices are not preemptable." (See also col. 9, line 15 through col. 10, line 34.) Gulick, therefore, discloses using non-maskable interrupts for termininating execution of isochronous tasks that fail to execute within their specified maximum duration. But Gulick does not disclose using non-maskable interrupts issued from the operating system to preempt an executing task by a higher priority task.

The Office Action then states that the function of the non-maskable interrupt issued by the operating system is similar to the interrupt issued by the timer "i.e., to terminate or preempt the executing task in favor of another task or higher priority task." (Office Action, page 4). Gulick explains, however, that the termination of tasks is distinct from preemption of tasks. (Col. 10, lines 39-46).

The office action states that "it would be beneficial to specify that the interrupt issued by the timer is also non-maskable, such that it is guaranteed that the interrupt service routine is executed." (Office Action, page 4). It is unclear how this would improve the system disclosed by Gulick. Accordingly, this rationale does not provide a convincing line of reasoning as to why a person of ordinary skill in the art would have been motivated to modify the system of Gulick as proposed in the Office Action.

According to the Office Action, "the combination of Gulick and Nakamura provides issuing a non-maskable interrupt from a timer (or counter) to preempt an executing task." (Office Action, page 4). As discussed above, Gulick does not disclose using non-maskable interrupts to preempt an executing task by a higher priority task. Nakamura discloses using non-maskable interrupts for gathering and storing program-execution information from processors in a multi-processor environment. Accordingly, Gulick and Nakamura, either alone or in combination, fail to teach or suggest issuing a non-maskable interrupt from a timer (or counter) to preempt an executing task for the purpose of scheduling resources in real time.

Accordingly, Gulick, Nakamura, and Reiffin, either alone or in combination, do not teach or suggest use of non-maskable interrupts as recited in claim 1, namely, instructing an interrupt controller, via non-maskable interrupts from a counter, to allocate CPU resources, and

instructing the CPU to allocate resources in real-time by the interrupt controller issuing non-maskable interrupts to the CPU.

For at least the reasons discussed above, Claim 1 is in condition for allowance. Claims 2-8 ultimately depend from claim 1 and are allowable for at least the same reasons as claim 1.

Independent claims 13, 16, and 19 contain limitations directed to the use of non-maskable interrupts that are similar to the limitations discussed above in connection with claim 1. Accordingly, applicant respectfully submits that claims 13, 16, and 19 contain patentable subject matter and are in condition for allowance for at least reasons similar to those discussed above in connection with claim 1. Claims 14-15, 17-18, 21-25, and 27-30, properly depend upon at one of independent claims 13, 16, and 19 and are, therefore, also in condition for allowance.
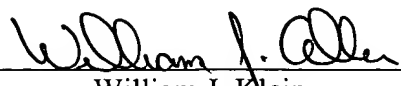
Conclusion

In view of the above discussion, Applicant respectfully submits that the pending claims are in condition for allowance. Reconsideration and allowance of the pending claims is respectfully requested. Should the Examiner believe that a conversation with the Applicant's representative would be useful in the prosecution of this case, the Examiner is invited and encouraged to call the Applicant's representative.

Respectfully submitted,

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